

CLAIMS

What is claimed is:

- 1 ^{Sub} 1. A fiber optic module for coupling photons between
2 optoelectronic devices and optical fibers, the fiber optic
3 module comprising:
4 a base;
5 a first horizontal printed circuit board (PCB) arranged
6 horizontally with the base and parallel to a first optical
7 axis of a first optoelectronic device, the first
8 optoelectronic device having terminals coupled to the first
9 horizontal printed circuit board; and
10 a second vertical printed circuit board (PCB) arranged at
11 a perpendicular angle with the base and parallel to a second
12 optical axis of a second optoelectronic device, the second
13 optoelectronic device having terminals coupled to the second
14 vertical printed circuit board.
- 1 2. The fiber optic module of claim 1 further comprising:
2 a housing coupled to the base.
- 1 3. The fiber optic module of claim 2 wherein,
2 the housing is a shielded housing to encase the first and
3 second printed circuit boards to reduce electromagnetic
4 interference (EMI).
- 1 4. The fiber optic module of claim 3 wherein,
2 the housing has an inner septum to separate the fiber
3 optic module into a first side and a second side and the inner
4 septum is a conductive shield to reduce crosstalk
5 electromagnetic radiation.

1 5. The fiber optic module of claim 1 wherein,
2 the base has a first and second opening;
3 the first horizontal printed circuit board has a
4 plurality of pins extending through the first opening in the
5 base to couple to a host printed circuit board; and
6 the second vertical printed circuit board has a plurality
7 of pins extending through the second opening in the base to
8 couple to the host printed circuit board.

1 6. The fiber optic module of claim 5 wherein,
2 the first and second opening in the base are a plurality
3 of pin holes in the base.

1 7. The fiber optic module of claim 5 wherein,
2 the first and second opening in the base are a first and
3 second cutout in the base.

1 8. The fiber optic module of claim 1 wherein, the first
2 horizontal and second vertical printed circuit boards further
3 comprises:

4 electrical components coupled between the first
5 optoelectronic device and the plurality of pins of the first
6 printed circuit board and between the second optoelectronic
7 device and the plurality of pins of the second printed circuit
8 board, the electrical components for controlling the first and
9 second optoelectronic devices.

1 9. The fiber optic module of claim 1 wherein, the first
2 horizontal printed circuit board further comprises:

3 a ground plane to reduce electro-magnetic fields
4 generated by the electrical components.

1 10. The fiber optic module of claim 1 wherein, the second
2 vertical printed circuit board further comprises:
3 a ground plane to reduce electro-magnetic fields
4 generated by the electrical components.

1 11. The fiber optic module of claim 1 further comprising:
2 a first optical block coupled to the first optoelectronic
3 device, the first optical block having a first opening to
4 receive the first optoelectronic device, and
5 a first lens to couple photons between the first
6 optoelectronic device and an optical fiber.

1 12. The fiber optic module of claim 11 further
2 comprising:
3 a nose coupled to the base, the nose to receive an
4 optical fiber connector and to hold an optical fiber
5 substantially fixed and aligned with an optical opening of the
6 optical block.

1 13. The fiber optic module of claim 12 further
2 comprising:
3 a nose shield surrounding the nose to reduce
4 electromagnetic interference.

1 14. The fiber optic module of claim 1 further comprising:
2 a second optical block coupled to the second
3 optoelectronic device, the second optical block having
4 a second opening to receive the second optoelectronic
5 device, and
6 a second lens to couple photons between the second
7 optoelectronic device and an optical fiber.

1 15. The fiber optic module of claim 11 further
2 comprising:

3 a second optical block coupled to the second
4 optoelectronic device, the second optical block having
5 a second opening to receive the second optoelectronic
6 device, and

7 a second lens to couple photons between the second
8 optoelectronic device and an optical fiber.

1 16. The fiber optic module of claim 1 further comprising:
2 an optical block coupled to the first and second

3 optoelectronic devices, the optical block having

4 first and second openings to receive the first and second
5 optoelectronic devices,

6 a first lens to couple photons between the first
7 optoelectronic device and a first optical fiber, and

8 a second lens to couple photons between the second
9 optoelectronic device and a second optical fiber.

1 17. The fiber optic module of claim 16, wherein,

2 the first lens of the optical block to launch photons
3 into the first optical fiber from the first optoelectronic
4 device.

1 18. The fiber optic module of claim 16, wherein,

2 the second lens of the optical block is a focusing lens
3 to receive photons from the second optical fiber and to couple
4 them to the second optoelectronic device.

1 19. The fiber optic module of claim 16 further
2 comprising:

3 a nose coupled to the base, the nose to receive an
4 optical fiber connector and to hold an optical fiber
5 substantially fixed and aligned with an optical opening of the
6 optical block.

1 20. The fiber optic module of claim 19 further
2 comprising:

3 a nose shield surrounding the nose to reduce
4 electromagnetic interference.

1 21. The fiber optic module of claim 13, wherein,
2 the first optoelectronic device is a photodetector.

1 22. The fiber optic module of claim 13, wherein,
2 the second optoelectronic device is an emitter.

1 23. The fiber optic module of claim 22, wherein,
2 the emitter is a vertical cavity surface emitting laser
3 (VCSEL).

1 24. A fiber optic transceiver for coupling photons
2 between optoelectronic devices and optical fibers, the fiber
3 optic transceiver comprising:

4 a base;

5 a first vertical printed circuit board (PCB) arranged at
6 a perpendicular angle with the base and parallel to a first
7 optical axis of a first optoelectronic device, the first
8 vertical printed circuit board having a first connecting means
9 to couple to an external printed circuit board, the first
10 optoelectronic device having terminals coupled to the first
11 vertical printed circuit board;

12 a second slanted printed circuit board (PCB) arranged at